

product containing a by-product salt was dissolved in 750 parts of methyl isobutyl ketone. 10 parts of 30% NaOH was added to the solution, followed by reacting at 70°C for 1 hour. After the reaction terminated, the reaction solution was washed twice with 200 parts of water. After the separation of oil and water, the separated oil layer was distilled to recover methyl isobutyl ketone to obtain an epoxy resin (a) having an epoxy equivalent weight of 310g/eq. and a softening point of 69°C. By calculation from the epoxy equivalent weight, the epoxy resin (a) thus obtained is that 5 groups of 6.2 alcoholic hydroxyl groups existing in the bisphenol F type epoxy compound for the starting material were epoxydated. 310 parts of the epoxy resin (a) and 251 parts of carbitol acetate were heated at 90°C under stirring to dissolve. The solution thus obtained was cooled down to 60°C, followed by adding 60 parts of acrylic acid, 97 parts of dimeric acid (acid value: 196mgKOH/g), 0.8 parts of methylhydroquinone, and 2.5 parts of triphenyl phosphine to dissolve by heating at 80°C and then reacting at 98°C for 35 hours to obtain an epoxy acrylate having an acid value of 0.5mgKOH/g and a solid rate of 65%.

Then, 718.5 parts of the epoxy acrylate, 100 parts of succinic anhydride and 54 parts of carbitol acetate were reacted at 90°C for 6 hours to obtain an unsaturated group-containing polycarboxylic acid resin (B-1) having an acid value in solid of 99mgKOH/g and a solid rate of 65%.

Example for synthesizing a thermoplastic polymer (D)

Synthesis Example 7

121.5g of the solution having a methylcellosolve /toluene ratio by weight of 3/2 was set in a flask, and heated up to 85°C to leave for 1 hour. A solution of 13.5g of methacrylic acid, 46.8g of methyl methacrylate, 38.2g of ethyl acrylate, 3.2g of 2-hydroxyethyl methacrylate, 1.5g of 2-ethylhexyl acrylate, 0.17g of azobisisobutyronitrile, 18.7g of methylcellosolve and 12.5g of toluene was added dropwise for 4 hours to react. Then, 7.1g of methylcellosolve was added to keep warming for 2 hours. A solution of 0.6g of methacrylic acid, 0.54g of azobisisobutyronitrile, 2.9g of methylcellosolve and 1.9g of toluene was added to keep warming for another 2 hours. Then, a solution of 0.024g of azobisisobutyronitrile dissolved in 1.2g of methylcellosolve was added to keep warming for 5 hours. 0.01g of hydroquinone was added to the reaction solution, followed by cooling to obtain a carboxyl group-containing thermoplastic polymer (D-1) having an average molecular weight of 84,000, an unvolatile matter rate of 38.5% by weight, and a acid value in solid of 85mgKOH/g.

Example 1 to 4 and Comparative Example 1

The resin compositions were prepared according to their

respective constitutions as shown in Table 1 to assay them on water solubility. The obtained resin compositions were each applied to the surfaces of 188 μ m highly adhesive PET films by a guide so that their membranes might have a thickness of 10 μ m, and were irradiated at 200mJ/cm² to obtain their cured membranes.

The cured membranes were assayed on curing, adhesion, pencil hardness, and water resistance to show in Table 1.

(1) Curing: tackiness was determined by finger touching.

○: no tackiness

△: a little tackiness

×: a great tackiness

(2) Adhesion: a net matrix having a hundred of 1mm squares was prepared on a test piece according to the JIS K5400 to carry out a peeling test with a cellophane tape. Each square was observed to determine whether it was peeled or not. Adhesion was assayed depending on the number of squares that were not peeled.

○: 100/100

△: 50/100 to 90/100

×: 0/100 to 50/100

(3) Pencil hardness: the assay was carried out according to the JIS K5400.

(4) Water resistance: a test piece was dipped in water at a